CLAIMS

What is claimed is:

1. A wireless communication receiver comprising:

a front-end circuit to receive an amplitude modulated data signal and an associated reference signal, wherein a transmit power of the data signal is unknown to the receiver; and

a processing circuit to determine a scaling factor based on the reference and data signals for demodulating the data signal, wherein the scaling factor relates received amplitudes of the data and reference signals.

2. The receiver of claim 1, wherein the processing circuit is configured to determine the scaling factor as an amplitude gain factor applied to recovered information symbols obtained from the data signal during RAKE despreading and combining operations, or applied to nominal symbol values used by the receiver in demodulating the recovered information symbols.

3. The receiver of claim 2, wherein the nominal symbol values comprise a set of predefined modulation constellation points.

4. The receiver of claim 2, wherein the receiver is configured to determine a channel impulse response estimate and noise covariance estimate from the reference signal.

5. The receiver of claim 4, wherein the RAKE combining operations comprise obtaining combining weights based on the channel impulse response estimate and the noise covariance estimate.

6. The receiver of claim 1, wherein the processing circuit comprises a scaling processor and a demodulator, and wherein the scaling circuit is configured to generate a scaled signal by

applying the scaling factor to a RAKE combined signal comprising the recovered information symbols, and wherein the demodulator is configured to demodulate the scaled signal.

7. The receiver of claim 1, wherein the processing circuit comprises a scaling processor and a demodulator, and wherein the scaling circuit is configured to generate the scaling factor and the demodulator is configured to demodulate the recovered information symbols by applying the scaling factor to nominal symbol values corresponding to a defined amplitude modulation constellation.

8. The receiver of claim 1, wherein the processing circuit is configured to determine the scaling factor explicitly as a gain factor based on a gain difference in amplitude between the reference and data signals.

9. The receiver of claim 8, wherein the processing circuit generates a RAKE combined signal by despreading and RAKE combining the data signal, and applies the gain factor to the RAKE combined signal for demodulation of the RAKE combined signal.

10. The receiver of claim 1, wherein the processing circuit is configured to determine the scaling factor implicitly based on a Signal-to-Noise Ratio (SNR) of a RAKE combined signal derived from the data signal.

11. The receiver of claim 1, wherein the processing circuit determines the SNR of the data signal within a time period in which fading variations of the data signal are assumed to be minimal.

12. The receiver of claim 11, wherein the processing circuit determines the SNR over all parallel code channels transmitted during the time period.

13. The receiver of claim 1, wherein the processing circuit comprises:

a scaling processor to generate the scaling factor;

a RAKE receiver to generate a RAKE combined signal by despreading and RAKE combining the data signal; and

a demodulator to demodulate the RAKE combined signal.

14. The receiver of claim 13, wherein the scaling processor compensates the RAKE combined signal based on the scaling factor.

15. The receiver of claim 14, wherein the scaling processor determines the scaling factor as a gain factor based on an average power of symbols in the RAKE combined signal, one or more RAKE combining weights used to form the RAKE combined signal, a reference signal channel response, and noise covariance between RAKE fingers of the RAKE receiver.

16. The receiver of claim 13, wherein the demodulator compensates a nominal symbol constellation using the scaling factor as part of demodulating the RAKE combined signal.

17. The receiver of claim 1, wherein the processing circuit comprises one or more Integrated Circuit (IC) devices.

18. The receiver of claim 1, wherein the processing circuit comprises a scaling processor to determine the scaling factor, and wherein at least the scaling processor is implemented as an Integrated Circuit (IC) device.

19. The receiver of claim 1, wherein the receiver comprises a Code Division Multiple Access (CDMA) receiver.

20. The receiver of claim 19, wherein the CDMA receiver comprises a Wideband CDMA (WCDMA) receiver, and wherein the processing circuit is configured to determine the scaling factor for a received High Speed-Downlink Shared Channel (HS-DSCH) signal as the received data signal.

21. The receiver of claim 1, wherein the processing circuit comprises a scaling processor configured to generate the scaling factor as a function of an amplitude modulation envelope of the data signal such that the processing circuit can determine distance metrics relating constellation positions of each recovered information symbols to nominal symbol constellation positions.

22. A computer readable medium storing a computer program for instructing a receiver comprising:

program instructions to determine a scaling factor relating an amplitude-modulated received data signal to an associated received reference signal, wherein a transmit power of the data signal is unknown to the receiver; and

program instructions to demodulate the data signal based on the scaling factor.

23. The computer readable medium storing a computer program of claim 22, wherein the program instructions to demodulate the data signal based on the scaling factor comprise one of program instructions to apply the scaling factor to recovered information symbols obtained from the data signal during RAKE despreading and combining operations, and program instructions to apply the scaling factor to nominal symbol values used by the receiver in demodulating the recovered information symbols.

24. The computer readable medium storing a computer program of claim 23, wherein the nominal symbol values comprise a set of predefined modulation constellation points.

25. The computer readable medium storing a computer program of claim 24, further comprising program instructions to determine a channel impulse response estimate and noise covariance estimate from the reference signal.

26. The computer readable medium storing a computer program of claim 25, wherein program instructions to perform the RAKE combining operations comprise obtaining combining weights based on the channel impulse response estimate and the noise covariance estimate.

27. The computer readable medium storing a computer program of claim 22, wherein the program instructions to determine the scaling factor comprise program instructions to the scaling factor explicitly as a gain factor based on a gain difference in amplitude between the reference and data signals.

28. The computer readable medium storing a computer program of claim 27, wherein the program instructions to demodulate the data signal based on the scaling factor comprise program instructions to apply the gain factor to a RAKE combined signal generated by despreading and RAKE combining the data signal, which is demodulated by the receiver.

29. The computer readable medium storing a computer program of claim 28, wherein the program instructions to determine the scaling factor comprise program instructions to determine the scaling factor implicitly based on a Signal-to-Noise Ratio (SNR) of the RAKE combined signal.

30. The computer readable medium storing a computer program of claim 22, further comprising program instructions to determine a SNR associated with the data signal within a time period in which fading variations of data signal are assumed to be minimal.

31. The computer readable medium storing a computer program of claim 30, wherein the program instructions to determine the SNR associated with the data signal comprise program instructions to determine a SNR over all parallel code channels transmitted to the receiver during the time period.

32. The computer readable medium storing a computer program of claim 30, wherein the data signal is a Wideband CDMA (WCDMA) High Speed-Downlink Shared Channel (HS-DSCH) signal, and further comprising program instructions to determine the time period as a subinterval of a Transmit Time Interval (TTI) of the HS-DSCH signal.

33. The computer readable medium storing a computer program of claim 22, wherein the program instructions to demodulate the data signal based on the scaling factor comprise program instructions to apply the scaling factor to a RAKE combined signal derived from the data signal, and then demodulate the RAKE combined signal.

34. The computer readable medium storing a computer program of claim 33, wherein the program instructions to determine the scaling factor comprise program instructions to determine the scaling factor as a gain factor based on an average power of symbols in the RAKE combined signal, one or more RAKE combining weights used to form the RAKE combined signal, a reference signal channel response, and noise covariance between RAKE fingers of a RAKE receiver providing the RAKE combined signal.

35. The computer readable medium storing a computer program of claim 22, wherein the program instructions to demodulate the data signal based on the scaling factor comprise program instructions to scale a nominal symbol constellation using the scaling factor as part of demodulating the data signal.

36. A method of demodulating an amplitude modulated received data signal, wherein a transmit power of the data signal is unknown, the method comprising:

determining a scaling factor for the data signal based on the data signal and a reference signal received in association with the data signal for estimating a radio channel of the data signal; and

demodulating the data signal based on the scaling factor.

37. The method of claim 36, wherein demodulating the data signal based on the scaling factor comprises scaling recovered information symbols obtained from the data signal and demodulating the scaled recovered information symbols.

38. The method of claim 36, wherein scaling recovered information symbols obtained from the data signal and demodulating the scaled recovered information symbols comprises calculating the scaling factor based on signal powers of the recovered information symbols.

39. The method of claim 36, wherein demodulating the data signal based on the scaling factor comprises scaling nominal symbol values used during demodulation of recovered information symbols obtained from the data signal.

40. The method of claim 39, wherein scaling nominal symbol values used during demodulation of recovered information symbols obtained from the data signal comprises determining a Signal-to-Noise Ratio (SNR) for the recovered information symbols and scaling the nominal symbol values by the SNR.

41. The method of claim 40, further comprising determining a new SNR in each of one or more time intervals in which fading variations of the data signal are minimal.

42. The method of claim 36, wherein determining a scaling factor for the data signal based on the data signal and a reference signal received in association with the data signal for estimating a radio channel of the data signal comprises determining a first scaling factor for a first iteration of symbol demodulation, and then using results from the first iteration of symbol demodulation to obtain an improved, second scaling factor for a second iteration of symbol demodulation.

43. The method of claim 36, wherein determining a scaling factor for the data signal based on the data signal and a reference signal received in association with the data signal for estimating a radio channel of the data signal comprises determining the scaling factor as an amplitude gain factor applied to recovered information symbols obtained from the data signal during RAKE despreading and combining operations, or applied to nominal symbol values used by the receiver in demodulating the recovered information symbols.

44. The method of claim 43, further comprising storing a set of predefined modulation constellation points as the nominal symbol values.

45. The method of claim 43, further comprising determining a channel impulse response estimate and noise covariance estimate from the reference signal.

46. The method of claim 45, wherein the RAKE combining operations comprise obtaining combining weights based on the channel impulse response estimate and the noise covariance estimate.

47. A processing circuit for use in a wireless communication receiver, the processing circuit comprising:

a scaling circuit to determine a scaling factor relating received amplitudes of an amplitude modulated data signal and a reference signal, wherein a transmit power of the data signal is unknown to the receiver;

a demodulator circuit to demodulate the data signal in accordance with scaled amplitude information that is based on the scaling factor.

48. The processing circuit of claim 47, wherein the scaling circuit is configured to generate scaled information symbols by scaling amplitudes of information symbols recovered from the data signal and providing the scaled information symbols to the demodulator circuit for demodulation.

49. The processing circuit of claim 47, wherein the scaling circuit is configured to calculate the scaling factor based on a signal-to-noise ratio of a RAKE combined signal generated from the data signal.

50. The processing circuit of claim 47, wherein the demodulator circuit is configured to scale nominal symbol values in a reference amplitude modulation constellation based on the scaling factor and to demodulate information symbols recovered from the data signal based on determining positions of the information symbols relative of the scaled nominal symbol values.

51. The processing circuit of claim 47, wherein the scaling circuit is configured to generated scaled information symbols by scaling amplitudes of information symbols recovered from the data signal based on the scaling factor, and wherein the demodulator circuit is configured to demodulate the scaled information symbols by determining positions of the scaled information symbols relative to nominal symbol values in a reference amplitude modulation constellation.

52. A wireless terminal for use in a wireless communication network comprising:

a transmitter to transmit signals to one or more network receivers; and

a receiver to receive signals transmitted from one or more network transmitters;

said receiver comprising:

a front-end circuit to receive an amplitude modulated data signal and an associated reference signal, wherein a transmit power of the data signal is unknown to the receiver; and

a processing circuit to determine a scaling factor based on the reference and data signals for demodulating the data signal, wherein the scaling factor relates received amplitudes of the data and reference signals.

53. The wireless terminal of claim 52, wherein the processing circuit is configured to determine the scaling factor as an amplitude gain factor applied to recovered information symbols obtained from the data signal during RAKE despreading operations, or applied to nominal symbol values used by the receiver in demodulating the recovered information symbols.

54. The wireless terminal of claim 52, wherein the processing circuit comprises a scaling processor and a demodulator, and wherein the scaling circuit is configured to generate a scaled signal by applying the scaling factor to a RAKE combined signal comprising the recovered information symbols, and wherein the demodulator is configured to demodulate the scaled signal.

55. The wireless terminal of claim 52, wherein the processing circuit comprises a scaling processor and a demodulator, and wherein the scaling circuit is configured to generate the scaling factor and the demodulator is configured to demodulate the recovered information symbols by applying the scaling factor to nominal symbol values corresponding to a defined amplitude modulation constellation.

56. The wireless terminal of claim 52, wherein the processing circuit is configured to determine the scaling factor explicitly as a gain factor based on a gain difference in amplitude between the reference and data signals.

57. The wireless terminal of claim 56, wherein the processing circuit generates a RAKE combined signal by despreading and RAKE combining the data signal, and applies the gain factor to the RAKE combined signal for demodulation of the RAKE combined signal.

58. The wireless terminal of claim 52, wherein the processing circuit is configured to determine the scaling factor implicitly based on a Signal-to-Noise Ratio (SNR) of a RAKE combined signal derived from the data signal.

59. The wireless terminal of claim 52, wherein the processing circuit determines the SNR of the data signal within a time period in which fading variations of the data signal are assumed to be minimal.

60. The wireless terminal of claim 59, wherein the processing circuit determines the SNR over all parallel code channels transmitted during the time period.

61. The wireless terminal of claim 52, wherein the processing circuit comprises:

a scaling processor to generate the scaling factor;

a RAKE receiver to generate a RAKE combined signal by despreading and RAKE combining the data signal; and

a demodulator to demodulate the RAKE combined signal.

62. The wireless terminal of claim 61, wherein the scaling processor compensates the RAKE combined signal based on the scaling factor.

63. The wireless terminal of claim 62, wherein the scaling processor determines the scaling factor as a gain factor based on an average power of symbols in the RAKE combined signal, one or more RAKE combining weights used to form the RAKE combined signal, a reference signal channel response, and noise covariance between RAKE fingers of the RAKE receiver.

64. The wireless terminal of claim 61, wherein the demodulator compensates a nominal symbol constellation using the scaling factor as part of demodulating the RAKE combined signal.

65. The wireless terminal of claim 52, wherein the processing circuit comprises one or more Integrated Circuit (IC) devices.

66. The wireless terminal of claim 52, wherein the processing circuit comprises a scaling processor to determine the scaling factor, and wherein at least the scaling processor is implemented as an Integrated Circuit (IC) device.

67. The wireless terminal of claim 52, wherein the receiver comprises a Code Division Multiple Access (CDMA) receiver.

68. The wireless terminal of claim 67, wherein the CDMA receiver comprises a Wideband CDMA (WCDMA) receiver, and wherein the processing circuit is configured to determine the scaling factor for a received High Speed-Downlink Shared Channel (HS-DSCH) signal as the received data signal.

69. The wireless terminal of claim 52, wherein the processing circuit comprises a scaling processor configured to generate the scaling factor as a function of an amplitude modulation envelope of the data signal such that the processing circuit can determine distance metrics relating constellation positions of each recovered information symbols to nominal symbol constellation positions.